

Microgravity Compatible Gas-Liquid Separation using Capillary Pressure Gradients, Phase I

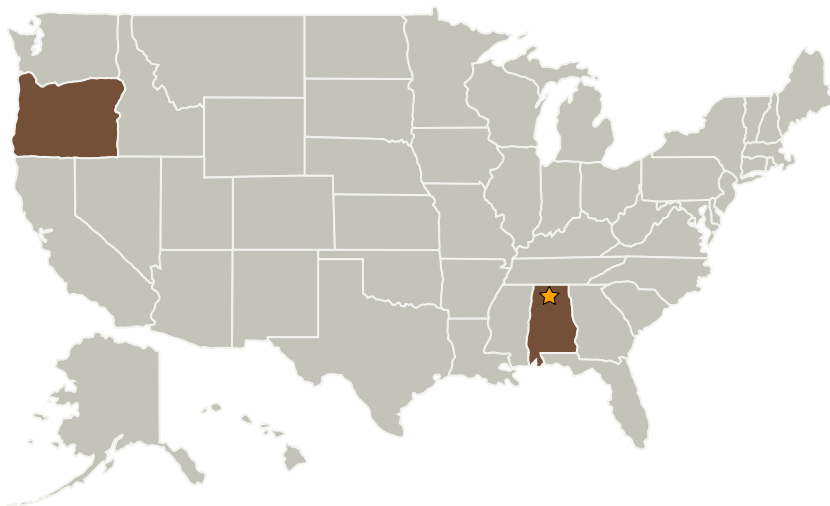
Completed Technology Project (2006 - 2006)



Project Introduction

An innovative microgravity and hypogravity compatible Gas-Liquid Separator (GLS) is proposed. This novel GLS consists of an ordered array of variable sized water repellant granular particles that result in a spatial surface energy density gradient within the GLS. The resultant capillary pressure causes gas and water to flow toward different outlet GLS positions. The device contains no moving parts and is compatible with deployment in a variety of NASA ALS and ECLSS applications. Preliminary experiments, conducted in a vertically oriented quasi two-dimensional system, separated an air-water mixture using the proposed technology. The capillary pressure gradient within the GLS caused a flowing gas-water mixture to separate into a gas-enriched stream and a water stream. The gas-enriched stream exited at the bottom of the GLS, counter to the buoyancy force, and the water stream exited at the top of the GLS. This flow response clearly demonstrates microgravity compatibility. The Phase I project will demonstrate the feasibility of this innovative GLS technology. The Phase II program will deliver to NASA a full-scale GLS with test documentation that will allow evaluation of the technology for specific ALS or ECLSS applications. This technology demonstrator will also form the basis for multiple commercial applications.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Marshall Space Flight Center (MSFC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★ Marshall Space Flight Center (MSFC)	Lead Organization	NASA Center	Huntsville, Alabama
UMPQUA Research Company	Supporting Organization	Industry	Myrtle Creek, Oregon

Primary U.S. Work Locations

Alabama	Oregon
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Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX14 Thermal Management Systems
 - └ TX14.2 Thermal Control Components and Systems
 - └ TX14.2.3 Heat Rejection and Storage